

of State which may have conferred upon it powers in relation to secondary education. The Royal Commission on Secondary Education recommended that there should be a central authority, a Government Department, in London, to supervise secondary education and local authorities in the country. The opinion of the Government is that the central authority in London must be created and arranged before the local authorities in the country can be usefully set on foot, and it is to organise and arrange a central department in London to exercise the sort of functions recommended by the Royal Commission that this Bill has been brought before Parliament. The Bill proposes the abolition of the existing Committee of Council on Education and to replace it by a Board of Education consisting of the First Lord of the Treasury, the Chancellor of the Exchequer, and the Secretaries of State for various departments, having a President and a Parliamentary Secretary in the same manner as the Local Government Board and the Board of Trade. To this new Board of Education are to be transferred all the powers and functions which are at present exercised by the Committee of Council, so that it will stand in relation to educational matters and the distribution of the science and art grants and technical instruction exactly in the same position, and have exactly the same powers, as the present Education Department possesses.

### SCIENTIFIC SERIALS.

*American Journal of Science*, June.—Othniel Charles Marsh—portrait and obituary notice.—The Camden Chert of Tennessee and its Lower Oriskany Fauna, by J. M. Safford and C. Schuchert. The latter describes in detail a peculiar chert formation discovered by the former.—Recent discovery of rocks of the age of the Trenton formation at Akpabok Island, Ungava, by J. F. Whiteaves. Describes the fossils collected by Dr. R. Bell, of the Canadian Geological Survey, on Akpabok Island, between Ashe Inlet and Fort Chimo, and concludes that they belong to a lower geological horizon than the Hudson River formation as at first supposed.—Studies in the Cyperaceæ, No. 10, by T. Holm. Describes the North American species of *Fimbristylis*, Vahl.—On Roscolite, by W. F. Hillebrand and H. W. Turner. Roscolite is a vanadium mica, some specimens of which show a tendency to crystallise in little rosettes. It occurs most frequently embedded in quartz at Placerville, California. It contains 45 per cent.  $\text{SiO}_2$ , 24 per cent.  $\text{V}_2\text{O}_5$ , 11 per cent. alumina, 10 per cent. potash, 4 per cent. water, and traces of magnesia and ferrous oxide.—Gravitation in gaseous nebulae, by F. E. Nipher. If  $R$  be the radius of a spherical mass of gas of cosmical dimensions, and  $T$  its temperature, the product  $TR$  is constant. The heat capacity of such a gravitating mass is negative. If heat leaves the gas, it contracts and becomes warmer. The physical condition to be satisfied in order that a central mass or core, having a radius equal to that of the sun, should contain a mass equal to that of the sun, is that its temperature is 20 million degrees Centigrade. The pressure at the surface of this sphere is 366 million atmospheres. The average density of the spherical mass, which is three times the density at the surface of the hydrogen sun, is about 7 per cent. less than the average density of the sun itself, but the nature of the gas is immaterial. In the sun as it is, the rarefied external parts of the solar nebula have parted with their heat, and the temperature throughout the mass has ceased to be uniform. But the abolition of cosmical pressure has almost wholly compensated the fall in temperature of the sun from 20 millions at least to perhaps 10,000 degrees.

*Symons's Monthly Meteorological Magazine*, June.—Unprecedented frost in the United States in February 1899. In that month  $64^{\circ}\text{F}$  were recorded at Camden Town, being  $2^{\circ}\text{F}$  higher than any reading recorded in February in London during 104 previous years, while about the same time at New Orleans an equally unprecedented low reading of  $7^{\circ}\text{F}$  ( $25^{\circ}$  below freezing) was registered. Prof. Garriott, in charge of the forecast division, states that the most remarkable series of cold waves in the history of the Weather Bureau traversed the United States from the North Pacific to the South Atlantic coasts during the first half of February, damaging crops and fruit in the southern States to the extent of millions of dollars. The cause of this intense cold is ascribed to barometric depressions in the south, combined with a large area of high barometer over British north-west territory.—On a recent recurrence in weather: a lunar or 30-day period, by H. H. Clayton. The author has

treated the temperatures observed at the Blue Hill Meteorological Observatory, from July 1898 to February 1899, in the same way as Mr. A. MacDowall has treated the temperatures for the same time observed at Greenwich. The figures show a well-marked period of about thirty days, but the interval is too short to determine whether the period had the exact length of the lunar period, or had any relation of cause and effect.

*Wiedemann's Annalen der Physik und Chemie*, No. 5.—A double trough refractometer, by W. Hallwachs. The author describes certain improvements in his differential interference refractometer for liquids, and measurements made with it on solutions of cadmium bromide, sugar, chloracetic acid, and chloracetates.—Optical properties of burnt-in gold and platinum films, by G. Breithaupt. Thin layers of gold, platinum, and other metals were burnt into glass or obsidian, and tested with regard to their dispersion. Gold showed normal dispersion, so did brass, when well polished with cotton wool. Platinum, steel, and nickel steel showed anomalous dispersion.—A new method of detecting electric waves, by A. Neugschwender. This is the author's second communication on the subject of his damp anti-coherer. He found that the establishment of conductivity between the two sides of a metallic slit on moistening it depended upon the presence of some metallic salt in the moisture which could be separated electrolytically. Under the microscope the metal so separated out forms a tree-like formation, which suddenly breaks up on the impact of electric waves, thus destroying the conductivity.—Determination of the pitches of Appunn's pipes by optical and by acoustic means, by F. A. Schulze. The author has repeated Appunn's determinations of the pitches of high pipes by the method of revolving mirrors, by Kundt's dust figures, and by Quincke's interference tube. He confirms Stumpf's result that the highest Appunn pipes have pitches assigned to them which are wrong by several octaves.—Determination of high pitches by difference tones, by C. Stumpf. The author defends the trustworthiness of the method of difference tones against Appunn's criticism.—On the refracted wave at so-called total reflection, by W. Voigt. Against Ketteler's criticism the author maintains that there exists a stream of energy parallel to the surface of the second medium in "total" reflection, and that this stream of energy is nothing else than a ray of light.—Thermal insulators, by W. Hempel. This is a comparison of the insulating properties of Dewar tubes silvered on the outer surface of the inner tube, with those of wool and feathers. Eiderdown turns out to be the most effective of the old insulators, as it is capable of maintaining a charge of solid carbonic acid and ether below  $-66^{\circ}$  for an hour and a half, whereas the same charge surrounded by cotton or silk reaches  $-56^{\circ}$  in the same time, and  $-33^{\circ}$  when surrounded by an imperfect vacuum. At the same time, the charge remains below  $-70^{\circ}$  in a Dewar tube, the initial temperature in every case being  $-79^{\circ}$ .

### SOCIETIES AND ACADEMIES.

#### LONDON.

**Royal Society**, May 18.—"Diffusion of Ions into Gases." By John S. Townsend, M.A. (Dublin), Clerk Maxwell Student, Cavendish Laboratory, Cambridge. Communicated by Prof. J. J. Thomson, F.R.S.

In the paper upon this subject the principles of the theory of interdiffusion of gases are applied to the diffusion of ions produced in a gas by the action of Röntgen rays. When a gas is ionised in this way, and then removed from the action of the rays, the conductivity gradually disappears. If there are no electric forces acting on the gas, the loss of conductivity is due partly to the encounters between positive and negative ions, and partly the effect of the surface of the vessel which discharges those ions that come into contact with it.

The ions may be considered as a separate gas (A) mixed with the ordinary uncharged molecules (B), which are unaffected by the rays. When the mixture is passed along a metal tube there is a loss of conductivity, due to the ions coming into contact with the surface. A formula is given for calculating the rate of diffusion of the ions A into the gas B from this loss of conductivity, which was found experimentally. The following values were obtained for the coefficients of diffusion of ions into air, oxygen, carbonic acid, and hydrogen.

It was found that the rates of diffusion of the positive and negative ions differed more when the gas was dry than when it was moist.

Values of  $\kappa$  in Square Centimetres per Second.

| Gas              | $\kappa$ for + ions<br>in dry gas | $\kappa$ for - ions<br>in dry gas | $\kappa$ for + ions<br>in moist gas | $\kappa$ for - ions<br>in moist gas |
|------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| Air ...          | 0274                              | 042                               | 032                                 | 035                                 |
| Oxygen ...       | 025                               | 0396                              | 0298                                | 0358                                |
| Carbonic acid... | 023                               | 026                               | 0245                                | 0255                                |
| Hydrogen ...     | 123                               | 190                               | 128                                 | 142                                 |

From the equation of motion

$$\frac{1}{\kappa} p u = - \frac{d p}{d x} + n X e$$

(where  $p$  is the partial pressure of the ions,  $n$  the number of ions per c.c.,  $e$  the charge on each ion,  $X$  the electric force at any point, and  $u$  the velocity of the ion in the  $x$  direction), it can be seen that when  $\frac{d p}{d x} = 0$  the velocity  $u$ , due to the electric

force  $X$ , is  $\frac{n X e \kappa}{p}$ .

If the potential gradient is one volt per centimetre,  $X = \frac{1}{300}$  in electrostatic units, and the corresponding value of  $u$  is  $u_1 = \frac{\kappa e}{300} \cdot \frac{n}{p}$ .

Let  $N$  be the number of molecules per c.c. in a gas at pressure  $P$ , equal to the atmospheric pressure and temperature  $15^\circ \text{C}$ ., the temperature at which  $u_1$  and  $\kappa$  were determined.

The quotient  $\frac{N}{P}$  may be substituted for  $\frac{n}{p}$  in the above equation, and  $N e$  is therefore obtained in terms of quantities which can be determined experimentally.

$$N e = \frac{3}{\kappa} 10^9 u_1, \text{ since } P = 10^6 \text{ in C.G.S. units}$$

Substituting for  $u_1$  the mean velocities given by Prof. Rutherford (E. Rutherford, *Phil. Mag.*, November 1897), and for  $\kappa$  the mean coefficient of diffusion obtained for the dry gases, and the following values of  $N e$  are obtained:—

|                   |     |     |     |                              |
|-------------------|-----|-----|-----|------------------------------|
| Air ...           | ... | ... | ... | $N e_A = 1.35 \cdot 10^{10}$ |
| Oxygen ...        | ... | ... | ... | $N e_O = 1.25 \cdot 10^{10}$ |
| Carbonic acid ... | ... | ... | ... | $N e_C = 1.30 \cdot 10^{10}$ |
| Hydrogen ...      | ... | ... | ... | $N e_H = 1.00 \cdot 10^{10}$ |

Experiments on electrolysis show that one electrodynamic unit of electricity in passing through an electrolyte gives off  $1.23$  c.c. of hydrogen at temperature  $15^\circ \text{C}$ . and pressure  $10^6$  C.G.S. units. The number of atoms in this volume is  $2.46 N$ , so that if  $E$  is the charge on an atom of hydrogen in the liquid electrolyte

$$2.46 N E = 1 \text{ electrodynamic unit of quantity} \\ = 3 \cdot 10^{10} \text{ electrostatic units.}$$

Hence  $N E = 1.22 \cdot 10^{10}$ , the charge  $E$  being expressed in electrostatic units. Since  $N$  is constant, these numbers show that the charges on the ions produced by Röntgen rays in air, oxygen, carbonic acid, and hydrogen are all the same, and equal to the charge on an atom of hydrogen in a liquid electrolyte.

Prof. J. J. Thomson (J. J. Thomson, *Phil. Mag.*, December 1898) has shown that the charge on the ions in oxygen and hydrogen, which have been made conductors by Röntgen rays, is  $6 \cdot 10^{-10}$  electrostatic units, and is the same for both gases.

Taking this value for the charge  $e$ , the number of molecules in a cubic centimetre of a gas is obtained:

$$N = 2 \cdot 10^{19}.$$

The weight of a molecule of hydrogen  $\frac{p}{N}$  is therefore

$$4.5 \cdot 10^{-24} \text{ grammes.}$$

In order to prove that the positive and negative ions have the same charge, the ratio of the coefficients of diffusion must be shown to be equal to the ratio of the velocities. This sub-

ject has been investigated by Prof. Zeleny (J. Zeleny, *Phil. Mag.*, 1898), and it was found that the negative ion travels faster than the positive ion in air, oxygen and hydrogen, the ratio of the velocities being  $1.24$  for air and oxygen,  $1.15$  for hydrogen, and  $1.0$  for carbonic acid.

Royal Society, June 15.—“On the Orientation of Greek Temples, being the Results of some Observations taken in Greece and Sicily in the month of May 1898.” By F. C. Penrose, M.A., F.R.S.

The orientation of the Cabeirion Temple, near Thebes, on which the angle has been disputed (see p. 46 in my paper of 1897), was remeasured with the theodolite in May 1898, and the previous observations confirmed. An additional example is added from an archaic Temple of Neptune in the Isle of Poros, introducing the employment of the bright zodiacal star Regulus, which I had not before met with.

In Sicily the re-examination of the temples at Girgenti, where, in my former visit, I had relied for azimuth on the sun's shadow and the time, has enabled me to give to the elements some amendments in detail, the only point of consequence being that the orientation date of the temple named Juno Lacinia is brought within the period of the Hellenic colonisation of that city.

The most interesting point in the paper seems to be, that in the case of two Athenian temples, namely, the Theseum and the later Erechtheum—i.e. the temple now partially standing—it is shown that the days of those months on which the sunrise, heralded by the star, illuminated the sanctuary coincided exactly, on certain years of the Metonic cycle, with the days of the Athenian lunar months on which three important festivals known to be connected with at least one of those temples were held. The years so determined agree remarkably well with the probable dates of the dedication of those temples; and in the case of the first mentioned, the festival, which was named The Thesea, seems to leave little doubt that the traditional name of the temple, which has recently been much disputed, is the correct one.

“Collimator Magnets and the Determination of the Earth's Horizontal Magnetic Force.” By C. Chree, Sc.D., LL.D., F.R.S., Superintendent of the Kew Observatory. Communicated by the Kew Observatory Committee of the Royal Society.

During the last forty years, there have been examined at Kew Observatory upwards of 100 collimator magnets used in observing the horizontal force and declination.

The “constants” of these magnets—temperature and induction coefficients, and moment of inertia—have been determined at the Observatory, and the tables based on these determinations have served to reduce magnetic observations at a large number of the leading magnetic observatories.

The present paper deals with the data recorded in the Observatory books for the constants specified above, and with other quantities—such as the “permanent” magnetic moment—which are deducible from the records. It determines the mean values of the several quantities for the instruments of the leading English makers, and investigates whether relations do or do not exist between them. It then deduces from the records the probable errors in the values of the several quantities, proceeding on the hypothesis that the methods of determining them are correct. It next examines, from a mathematical standpoint, the accuracy of the formulæ employed in reducing horizontal force observations, and, from a physical standpoint, the possibility of differences between the quantities determined at the Observatory and the quantities actually concerned in horizontal force observations.

The various sources of uncertainty are dealt with, and an attempt is made to ascertain to what extent they may affect the values found for the horizontal force.

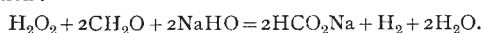
The results of the paper are of too technical a character to admit of their being summarised briefly in an intelligible way.

Physical Society, June 23.—Mr. T. H. Blakesley, Vice-President, in the chair.—A paper on the magnetic hysteresis of cobalt, by Prof. Fleming, Mr. A. W. Ashton, and Mr. H. J. Tomlinson, was read by Mr. Ashton. A rectangular sectioned circular ring of cobalt was insulated with silk tape and wound over with four secondary coils put on at quadrantal positions. Over these secondary coils six primary coils were placed, and the ring was submitted to a complete set of magnetic tests with a ballistic galvanometer. From these observations various

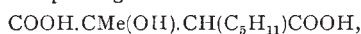


curves have been plotted, and the results have been compared with a similar set of readings taken on a cast iron ring. A chemical analysis of the cobalt showed that it contained about 1 per cent. of iron and 1 per cent. of nickel. The authors conclude that, although in general form the magnetisation curve for cobalt resembles that of cast iron, its hysteresis exponent is similar to that of annealed soft iron. The absolute hysteresis values corresponding to various maximum flux densities are, however, not very different from those of a typical variety of cast iron. Prof. Everett referred to the fact that the sample of cobalt contained about 1 per cent. of iron, and said that it would be interesting to know how cobalt free from iron would behave. The Chairman said that the hysteresis curves obtained from the step by step method could not be applied to dynamos, because the time taken to perform the cycle altered the shape of the curve. He would like to see the curves for cobalt determined in cases where the cycles were quickly executed.—A discussion on physical tables was commenced by Mr. J. Lupton. Mr. Lupton briefly reviewed some of the difficulties met with in compiling physical tables and in keeping them up to date. He divided them into four classes according to their objects, and criticised several well-known books of constants. He pointed out the danger of leaving out apparently obvious figures, and referred to the necessity for accurate proof reading. Prof. Everett said that in his work he had aimed at giving an idea of the meanings of various numbers, rather than stating them with great accuracy. He drew attention to the difficulty of condensing large series of numbers into a clear and concise table. Mr. Watson said that it was important that the units in which numbers were expressed should be stated at the head of each table. The Chairman having pointed out one or two small points to be attended to in the compilation of tables, the Society adjourned until next October.

**Chemical Society, June 15.**—Prof. T. E. Thorpe, President, in the chair.—The following papers were read:—On the decomposition of chlorates, with special reference to the evolution of chlorine and oxygen, by W. H. Sodeau. The author concludes that on heating barium chlorate, two reactions proceed simultaneously; (a) an exothermic decomposition into chloride and oxygen, and (b) an endothermic decomposition into oxide, chlorine and oxygen.—Action of hydrogen peroxide on formaldehyde, by A. Harden. Hydrogen peroxide and formaldehyde react in presence of much soda in accordance with the following equation:



With excess of formaldehyde reaction proceeds rapidly, whilst in presence of excess of hydrogen peroxide it proceeds slowly and incompletely. The behaviour of other oxides towards formaldehyde and soda has also been investigated.—Homocamphoric and camphonic acids, by A. Lapworth and E. M. Chapman.  $\alpha$ -Dibromocamphor is rapidly oxidised by nitric acid in presence of silver nitrate, with formation of small quantities of a nitro-compound,  $\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}_6$ , and a tribasic acid,  $\text{C}_{10}\text{H}_{16}\text{O}_6$ , named homocamphoric acid; the latter yields on heating first an anhydro-acid, and then a ketonic acid,  $\text{C}_9\text{H}_{14}\text{O}_3$ , termed camphonic acid.—Action of silver compounds on  $\alpha$ -dibromocamphor, by A. Lapworth.—The colouring matter of cotton flowers, by A. G. Perkin. The flowers of the cotton plant, *Gossypium herbaceum*, contain a glucoside, gossypetin,  $\text{C}_{16}\text{H}_{12}\text{O}_8$ ; it is a colouring matter, yields a hexacetyl-derivative, and resembles thujetin.—Experiments on the synthesis of camphoric acid, by H. A. Auden, W. H. Perkin, jun., and J. L. Rose. Ethyl isoamylacetate was converted into ethyl  $\alpha$ -isoamyl- $\beta\beta$ -hydroxycyanobutyrate, which on hydrolysis yielded methyl-hydroxyisoamylsuccinimide; the latter on further hydrolysis yielded the corresponding acid



from which it was hoped by elimination of water to synthesise camphoric acid. The attempt was not successful.—Methyl-isoamylsuccinic acid, i., by W. T. Lawrence.—Condensations of anhydrazetonebenzil and its analogues with aldehydes, by F. R. Japp and A. Findlay.—Triphenyloxazalone, by F. R. Japp and A. Findlay.—Interaction of phenanthraquinone, acetophenone, and ammonia, by F. R. Japp and A. N. Meldrum.—Furfuran derivatives from benzoin and phenols, by F. R. Japp and A. N. Meldrum.—Interaction of benzoin with phenylenediamines, by F. R. Japp and A. N. Meldrum.—The condensation of ethyl salts of acids of the acetylene series with ketonic

compounds, by S. Ruhemann and A. V. Cunningham.—Dextro-ac-tetrahydro- $\beta$ -naphthylamine, by W. J. Pope. Inactive ac-tetrahydro- $\beta$ -naphthylamine may be resolved into its optically active components by means of its dextro- $\alpha$ -bromocamphorsulphonate; the pure dextro-compound was thus prepared.—The resolution of racemic tetrahydroparatoluquinaldine into its optically active components, by W. J. Pope and E. M. Rich. Inactive tetrahydroparatoluquinaldine may be resolved into its optically active components by crystallisation with dextro- $\alpha$ -bromocamphorsulphonic acid.—Isomeric salts of hydrindamine containing pentavalent nitrogen, by F. S. Kipping. The author has endeavoured to resolve  $\alpha$ -hydrindamine into its optically active components by Pope and Peachey's method with bromocamphorsulphonic acid and by crystallisation with cis- $\pi$ -camphanic acid; two salts are formed in each case, but the regenerated base is optically inactive.—Synthesis of phenoketoheptamethylene, by F. S. Kipping and Miss L. Hall.—Organic compounds containing silicon, by F. S. Kipping and L. L. Lloyd. The authors have prepared triphenylsilicol,  $(\text{C}_6\text{H}_5)_3\text{Si.OH}$ , its acetyl derivative,  $(\text{C}_6\text{H}_5)_3\text{Si.OAc}$ , and the corresponding ether,  $(\text{C}_6\text{H}_5)_3\text{Si.O.Si(C}_6\text{H}_5)_3$ .—The velocity of reaction before complete equilibrium, by M. Wilderman.—The ultra-violet absorption spectra of albuminoids in relation to that of tyrosin, by A. W. Blyth.—An explanation of the laws which govern substitution in the case of benzenoid compounds (third notice), by H. E. Armstrong. The author advocates the view that in compounds which ordinarily furnish meta-derivatives, the radicle ( $\text{NO}_2$ ,  $\text{CO}_2\text{H}$ , &c.) is not only unattractive and possessed of little or no ortho-para-orienting power, but even exercises an inhibiting influence on these positions.—The colouring matters of dyer's broom and heather, by A. G. Perkin and F. G. Newbury.

**Linnean Society, June 15.**—Dr. A. Günther, F.R.S., President, in the chair.—The President exhibited a living specimen of a tree-frog (*Polypedates quadrilineatus*) which was introduced accidentally into Kew Gardens with a consignment of plants from Singapore. This is not the first instance of accidental introduction of a tropical frog into the Royal Gardens, Kew. Some five years ago a species of *Hylodes*, from Dominica, appeared in some numbers in several of the propagating-houses, and has evidently reproduced its species since arrival.—Mr. W. Whitwell exhibited: (1) The only known British specimen of *Botrychium matricariaefolium*, A. Braun, gathered in July 1887 on the seashore at Stevenston, Ayrshire (*Journ. Bot.*, 1898, pp. 291-297). (2) An undescribed variety of *Asplenium Ruta-muraria*, Linn., from an old wall on Dartmoor, about five miles from Plympton. (3) A specimen of rye with two ears on the same stalk, gathered at Romsey, Hants.—Mr. Robert T. Günther read a paper on the natural history of Lake Urmí in N.W. Persia, the neighbourhood of which he had explored during the autumn of last year. The collections which he had made there had been worked out by a number of specialists, each of whom had furnished a report on the specimens submitted to him. In many of the groups (notably amongst the fishes) several new species were described; and a good deal of interest centred in the skull and horns of a wild sheep which had been picked up on Koyun Daghi, the largest island in Lake Urmí. Although no living wild sheep were observed there during the traveller's short visit, small herds were reported to exist, the island, with lofty and precipitous hills, being apparently well adapted to their requirements. The head in question, that of an adult ram, unlike the typical *Ovis orientalis* found in Northern Persia and Armenia, more nearly approached that of *Ovis ophion*, the mufion of Cyprus, a curious and unexpected resemblance.—Dr. A. B. Rendle read a paper entitled "A systematic revision of the genus *Najas*," a primitive genus of Monocotyledons containing about thirty known species, generally distributed in both Old and New Worlds, and consisting of submerged herbs, often of great delicacy, growing in mud in fresh or brackish water.

**Royal Meteorological Society, June 21.**—Mr. F. C. Bayard, President, in the chair.—Dr. R. H. Scott, F.R.S., read a paper on the heavy falls of rain recorded at the seven observatories connected with the Meteorological Office during the twenty-eight years 1871-98. The data has been derived from the records of the Beckley self-recording rain gauges at the following places:—Valencia, Armagh, Glasgow, Aberdeen, Falmouth, Stonyhurst, and Kew. These records have been tabulated for each hour, and it is from these hourly tabulations

that Dr. Scott has extracted the heavy falls. He finds that Falmouth has the greatest frequency of heavy falls, the next station being Valencia, and then Stonyhurst. The most exceptional fall during the whole period was at Glasgow at five p.m. on August 11, 1895, when as much as 0.80 in. was collected in ten minutes. The information given in this paper is likely to be of much service to engineers who want to know the rate at which rain sometimes falls in short periods.—A paper by Mr. J. Baxendell, describing his new self-recording anemoscope, was read by the Secretary. This instrument, which records the direction of the wind on an open scale, has been in use at Southport for more than a year, and works very satisfactorily. The vane, which is an exceedingly light, but large double-bladed, one, is sensitive even in light airs, and is steady in the strongest gales. The records from this anemoscope, which were exhibited at the meeting, were very clear and of an interesting character, and showed the instrument to be a valuable companion to the Dines pressure tube anemometer.—A paper, by Mr. R. C. Mossman, on the average height of the barometer in London, was also read by the Secretary. Some years ago Mr. H. S. Eaton worked out the mean monthly and annual height of the barometer in London for one hundred years. Mr. Mossman has carried on this discussion for a further period of twenty years; but he finds that the results for the one hundred and twenty years are practically identical with those for one hundred years.

**Zoological Society, June 20.**—Dr. Albert Günther, F.R.S., Vice-President, in the chair.—Mr. W. E. de Winton made some remarks on a small collection of mammal-skins from British Central Africa, which had been transmitted to Mr. Slater by Mr. Alfred Sharpe, C.B. Mr. de Winton also exhibited the mounted heads of a male and female red-flanked Duiker (*Cephalophus rufilatus*, Gray), collected by Mr. J. F. Abadie in the Borgu country of the Niger district; and the skull of a male of the same species obtained by Captain W. Giffard near Gambaga, in the back country of the Gold Coast.—The Hon. Walter Rothschild read a memoir on the cassowaries, which contained notes on and an enumeration of the species and geographical races of these birds.—Mr. C. W. Andrews gave a description of a new type of bird, the skull and pelvis of which had lately been discovered by Mr. W. H. Shrubsole, enclosed in a nodule in the London clay of Sheppey.—A communication from Mr. J. V. Johnson treated of the antipatharian corals of Madeira, and of a specimen from the West Indies in the British Museum.—A communication was read from Mr. Stanley S. Flower, containing notes on the Proboscis monkey (*Nasalis larvatus*) made on a young male example of this animal which had lived for a short time in the Egyptian Zoological Gardens at Ghizeh, Cairo.—A communication from Mr. Alexander Sutherland on the temperature of the Ratitæ birds was based on observations made on specimens of birds of this family in the Society's Gardens.—Mr. G. A. Boulenger, F.R.S., read a paper on the American Spade-foot (*Scaphiopus solitarius*, Holbrook), in which he pointed out that this frog had affinities with both *Pelobates* and *Pelodytes*, and that these three genera together formed one natural family, viz. the *Pelobatidae*.—Mr. W. L. H. Duckworth read a paper containing an account of the female chimpanzee, known as "Johanna," living in the menagerie of Messrs. Barnum and Bailey. The history and habits, diet in captivity, intellectual attainments, physical proportions, and appearance of this ape were dealt with in the paper, as also was the question of species, the author regarding the specimen as allied to the chimpanzees rather than to the gorilla.—A communication from Mr. R. Lydekker gave an account of a new species of Kob antelope (specimens of which had recently been received in a collection from Sierra Leone), under the name of *Cobus nigricans*. Mr. Lydekker also drew attention to skins of a Kob from Barotseland, recently received at the British Museum, which he had identified with *C. senganus*. The specimens of the latter form he stated differed so slightly from the type of *C. vardonii* that he was inclined to regard them as not worthy of specific rank, and to refer them to a subspecies which he proposed to call *C. vardonii senganus*.—Mr. Lydekker also sent a description of a specimen of a leopard from the Caucasus, belonging to the collection of Prince Demidoff, which differed in several respects from the common leopard, and which he proposed to regard as a subspecies under the name of *Felis pardus tulliana*.—A third communication from Mr. R. Lydekker related to the former existence of a Sirenian of

some kind in St. Helena, which had been noticed by former observers in that island, but to which no reference had been made by recent authors.—Mr. F. E. Beddard, F.R.S., read a paper on the brain of the Capybara (*Hydrochoerus capybara*) based on examination of specimens in the Society's Gardens.—Mr. Beddard also read a paper prepared by himself and Miss Sophie M. Fedarb, containing notes on the anatomy of the worms *Perichaeta biserialis* and its variations and *Trichochoeta hesperidum*.—Dr. Woods Hutchinson read a paper on the zoological distribution of tuberculosis from observations made mainly in the Society's Gardens. Of 215 autopsies made in the prosector's room during the past six months, 49 presented the lesions of tuberculosis, i.e. 25.3 per cent. of the mammals and birds. This mortality fell most heavily upon the ruminants and gallinæ, and least so upon the carnivores and raptors. Race or family appeared to exert little influence upon susceptibility, mode of housing only a small amount, and food and food-habits much more. A close correspondence appeared to exist between immunity and the relative size of the heart in both birds and mammals.—A communication was read from Dr. A. G. Butler containing an account of a small collection—consisting of nineteen specimens—of butterflies sent home from Muscat by Lieut.-Colonel A. S. G. Jayakar.—Dr. J. W. Gregory read a paper containing an account of the West Indian species of corals of the genus *Madrepora*.—A communication was read from Marquis Ivrea on the black roe deer of Hanover.

## EDINBURGH.

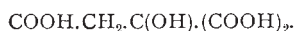
**Mathematical Society, June 9.**—Dr. Morgan, President, in the chair.—The following papers were read:—Systems of circles analogous to Tucker circles, part iii.; systems of conics connected with the triangle; systems of spheres connected with the tetrahedron, Mr. Third; "La perspective d'une conique est une conique" (démonstration élémentaire), M. L. Leau.

## PARIS.

**Academy of Sciences, June 19.**—M. van Tieghem in the chair.—On a class of isothermic surfaces connected with the deformation of surfaces of the second degree, by M. Gaston Darboux. A further development of the subject dealt with in a previous note.—On the determination of the integrals of the equations to partial derived functions of the second order by their values on a closed curve, by M. Émile Picard.—Late watering of the vine, by M. A. Müntz. Towards the end of a dry season the growth of the grapes is impeded and small yields are obtained, although the wine produced is often of higher quality. Nevertheless, this increased value does not compensate for the diminished quantity, and artificial watering is therefore resorted to. The author has experimented on the effects of this practice, and finds that the grapes thus treated increase in weight to the extent of 25 to 30 per cent. as compared with the untreated fruit. Part of this increase is due to simple absorption of water, but not the whole, since there is a notable increase in the sugar and vegetable acids. It is noteworthy that delayed watering causes a retrogression in the ripening process, the relative proportions of the sugar and acids becoming what they were at an earlier part of the year.—Note on the toxicity of the urine of children, more especially in cases of appendicitis, by MM. Lannelongue and Gaillard. The toxicity of the urine of normal children is inferior to that of the urine of adults, but is largely increased in cases of acute appendicitis. The colour of the pathological fluid is also more marked, and the density and amount of extractives present are greater.—Electromotive force produced in a flame by magnetic action, by M. R. Blondlot. If two platinum wires are placed symmetrically at the opposite edges of an ordinary gas flame and connected with a capillary electrometer, only a feeble oscillatory movement of the mercury is noticed, but a steady deflection is produced when the flame is placed between the poles of an electromagnet. This phenomenon is doubtless due to electromagnetic induction, the effect of the heated gases constantly ascending in the magnetic field being the production of an electromotive force the direction of which is normal both to the lines of force and to the direction in which the gases are moving.—Influence of the manner of introduction on the therapeutic effects of antidiphtheritic serum, by M. S. Arloing. From the experiments described it appears that with the dog the therapeutic effect of the serum is more marked when it is introduced into the blood instead of into the connective tissue, whereas with the guinea-pig the reverse is the case.—Observations made at the Bordeaux



Observatory on the partial eclipse of the sun, June 7, by MM. Féraud, Doublet, Esclançon and Courty.—On some anomalous surfaces applicable to a plane, by M. H. Lebesgue. The author shows that developable surfaces are not the only surfaces which are applicable to a plane.—On the calculation of the integrals of differential equations by the method of Cauchy-Lipchitz, by M. Paul Painlevé.—Comparison of the velocities of propagation of electromagnetic waves in air and along wires, by M. C. Gutton. The two velocities in question have been compared by a more exact method than those hitherto employed, and their equality verified to within 1 in 200.—Electrolytic action observed in the neighbourhood of a Crookes' tube, by MM. H. Bordier and Salvador. When an electrolytic cell consisting of two plates of copper or zinc immersed in a solution of copper or zinc sulphate is connected with a delicate galvanometer and placed in proximity to a Crookes' tube in action, a notable polarisation of the electrodes of the cell is observed. The effect is not due to the action of the X-rays, but is caused by a secondary, dark discharge from the anode and cathode of the tube, which is equivalent to a current of high electromotive force but of feeble intensity.—On magnet steels, by M. F. Osmond. Experiments on the magnetic properties of steels containing varying amounts of manganese and of nickel.—Researches on the vapours emitted by the two varieties of mercuric iodide, by M. D. Gernez. Experiments are described which show that the vapour of mercuric iodide, whatever its origin, is capable of condensing to form, at the same temperature, either the red or the yellow crystals of the compound, according as either variety is employed as a starting point for crystallisation. The condition of the vapour is, in fact, analogous to that of melted sulphur, from which three forms of crystals may be obtained at will according to the form of the crystal introduced as a nucleus.—Remarks on the oxides of sodium and on the chemical function of water as compared with that of hydrogen sulphide, by M. De Forcrand. The author discusses the heats of formation of the oxides of sodium, as determined by himself and by other observers, and endeavours to show that the two hydrogen atoms in the molecule of water are distinctly different in function, whereas in hydrogen sulphide they are of equal value. Water is therefore to be considered as an unsymmetrical, hydrogen sulphide as a symmetrical, compound, as may be indicated by the formulæ  $\text{H}-\text{OH}$  and  $\text{H}-\text{S}-\text{H}$  respectively.—On the decomposition of carbonic oxide in the presence of metallic oxides, by M. O. Boudouard. The experiments described in previous communications have been extended to a temperature of  $800^{\circ}\text{C}$ .; the metallic oxides employed were those of cobalt, nickel, and iron. The decomposition is a function of the time, the amount of carbonic anhydride formed increasing in a regular manner until the limit, at  $800^{\circ}$ , of 7 per cent. is reached. The velocity of the reaction is much greater at  $800^{\circ}$  than at  $650^{\circ}$ .—On the decomposition of carbonic anhydride in the presence of carbon, by M. O. Boudouard. An extension of previous researches on this reaction. The limiting composition of the gaseous mixture at  $800^{\circ}$  is 93 per cent. of carbonic oxide and 7 per cent. of carbonic anhydride. At  $925^{\circ}$  there still remained 4 per cent. of carbonic anhydride.—On a lower homologue of citric acid, by M. Augustin Durand. By treating the sodium derivative of ethylic oxaloacetate with hydrocyanic acid and hydrolysing the cyanhydrin thus produced, the authors have obtained a new acid of the composition



Experiments are in progress for the preparation of other homologues of citric acid.—On Morren's glands in European *Lumbricoides*, by M. Édouard de Ribaucourt. On the fall of leaves and the cicatrization of the wound, by M. A. Tison.—The upper layers of the Jurassic soil in Bas-Boulonnais, by M. Munier-Chalmas.—Crystallisation of blood-albumin, by Mlle. S. Gruzewska. Abundant crystalline deposits of albumin were obtained from the blood of the guinea-pig by employing a low temperature and working with solutions almost saturated with ammonium sulphate.

#### NEW SOUTH WALES.

Royal Society, May 3.—The President, G. H. Knibbs, in the chair.—The following gentlemen were elected officers for the current year:—President, W. M. Hamlet; Vice-Presidents, Prof. Anderson Stuart, Charles Moore, Prof. T. W. E. David,

Henry Deane; Hon. Treasurer, H. G. A. Wright; Hon. Secretaries, J. H. Maiden, G. H. Knibbs.—The theme of the anniversary address delivered by the President, Mr. G. H. Knibbs, was the influence of science upon civilisation.

#### AMSTERDAM.

Royal Academy of Sciences, May 27.—Prof. H. G. van de Sande Bakhuyzen in the chair.—Prof. Kamerlingh Onnes presented, for publication in the *Proceedings*, a paper by Dr. L. H. Siertsema, entitled "Measurements of the magnetic rotation of the plane of polarisation in oxygen at various pressures." The magnetic rotation in oxygen was measured in the same way as was formerly done in the case of pressures of 97, 73, 49 and 38 atmospheres, and at these pressures it was found to be proportional to the density of the gas.—Prof. van Bemmelen presented, on behalf of Dr. F. A. H. Schreinemakers, for publication in the *Proceedings*, a paper entitled "On the system water, phenol, acetone."—Prof. Lobry de Bruyn communicated the results of the inquiries of Prof. Holleman, who has determined how, on the nitration of benzoic acid and its methyl and ethyl esters, the proportion of the quantities of the three isomeric mononitro-derivatives, which are formed at the same time, varies with the temperature ( $-30^{\circ}$ ,  $0^{\circ}$  and  $+30^{\circ}$ ).—Prof. van de Sande Bakhuyzen presented, on behalf of Mr. H. F. Zwiers, a paper on the system of Sirius according to the most recent observations.

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